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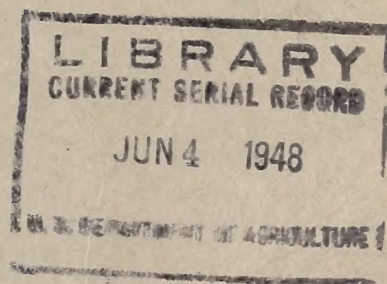


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FOREST RESOURCES
OF THE
EASTERN OZARK REGION
IN
MISSOURI



 **CENTRAL STATES**
FOREST EXPERIMENT STATION
Columbus 13, Ohio

Harold L. Mitchell, Director

FOREST RESOURCES
OF THE
EASTERN OZARK REGION
IN
MISSOURI
BY
THE FOREST SURVEY ORGANIZATION
at the

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The field work on which these statistics are based was done by the following men under the supervision of M. E. Becker:

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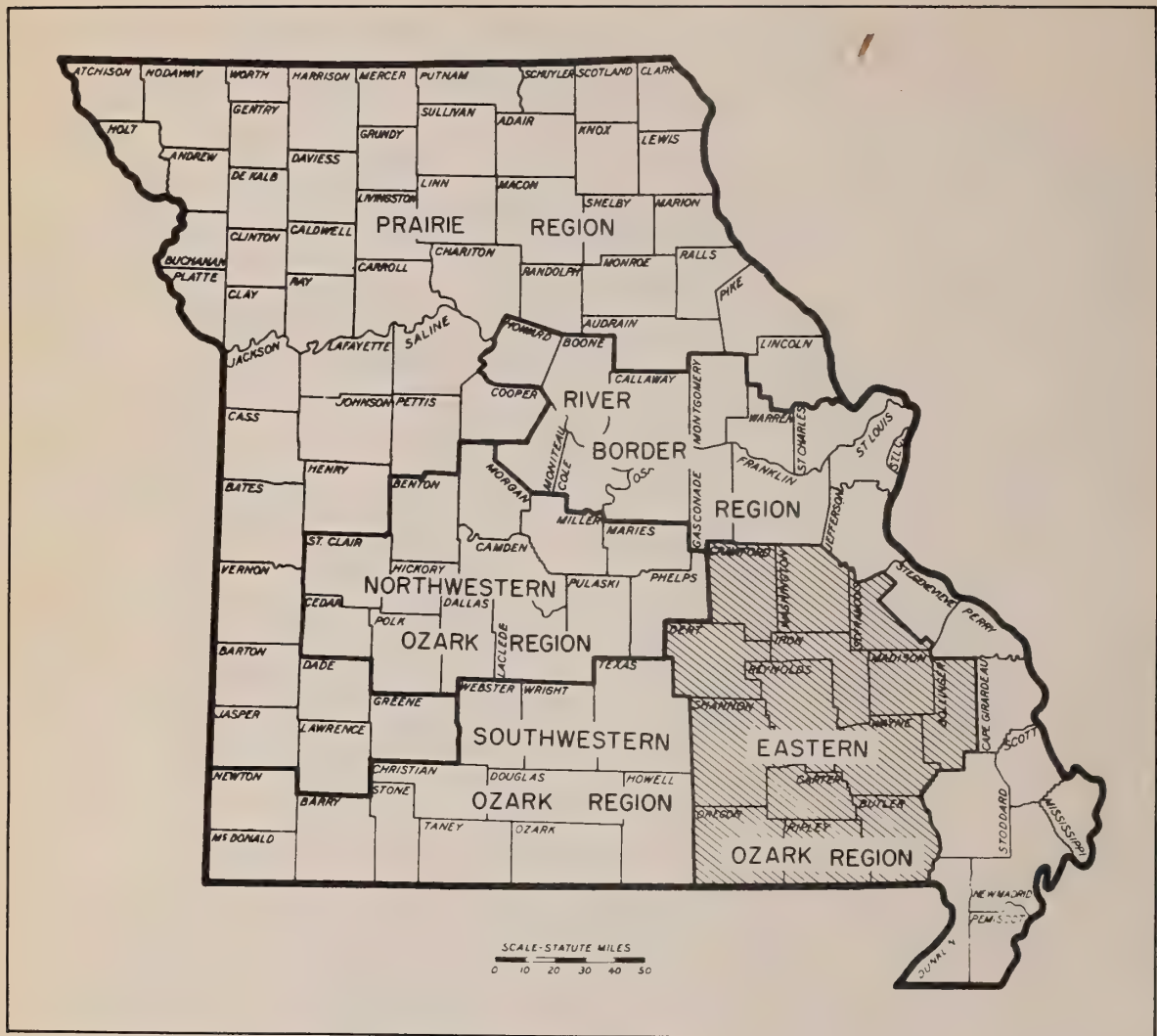
O. K. Hutchison, K. L. Quigley, and J. E. Wiggins did the photo interpreting work under the direction of K. E. Moessner. The office compilations were made by Margaret Peirsol, Betty Quilligan, Mary Lou Sterner, and Florence Karinen under the supervision of Lake Compton. G. L. Schnur prepared the volume tables and determined the statistical accuracy of tabular figures. Virginia Tomlinson, Alberta Hiatt, and Bonnie Jo Williams did the stenographic work and C. E. Hamm and K. W. Chrisemer the drafting.

FOREWORD

The Forest Survey is a Nation-wide activity of the Forest Service. The fivefold purpose of the Forest Survey is (1) to make a field inventory of the present supply of standing timber; (2) to ascertain the rate at which this supply is being increased through growth; (3) to determine the rate at which it is being diminished through industrial and domestic uses, windfall, fire, disease, and other causes; (4) to determine the present consumption and the probable future trend in requirements for forest products; and (5) to interpret and correlate these findings with existing and anticipated economic conditions, as an aid in the formulation of both private and public policies for use of land suitable for forest production.

The Forest Survey is conducted in the various forest regions by the forest experiment stations of the Forest Service. In Missouri, the project is directed by the Central States Forest Experiment Station with headquarters in Columbus, Ohio. For Survey purposes, the State has been divided into five principal regions based on character of forest, topography, and other factors that influence tree growth.

This Survey Release presents the more significant statistics on forest area and timber volume in 14 counties in the Eastern Ozark region of Missouri. As soon as statistical tabulations have been completed, other releases will be issued, giving similar information for the other important subdivisions of the State. Later, an analytical report for the entire State will be prepared, which will interpret forest area, timber volume, growth, and drain statistics in the light of existing and anticipated economic conditions. This interpretation will focus attention on the principal forest problems and will suggest possible solutions.



SIGNIFICANT FACTS CONCERNING THE FOREST RESOURCES

OF THE EASTERN OZARK REGION

The Eastern Ozark region of Missouri includes 14 counties in the southeastern portion of the State as shown in the map on the opposite page. It is a rough, broken country in which forest area predominates. Of its 6.2 million acres, 4.5 million, or 73 percent, support forests. No county has less than 54 percent of its land area in forest.

More than three-fourths of the commercial forest area is in private ownership. The Clark National Forest makes up most of the publicly-owned forest land.

Only 14 percent of the forest area has enough volume per acre to be classified as saw-timber stands (see Explanation of Terms used on page 15). Pole-timber stands make up 45 percent, and seedling and sapling stands, 35 percent, and poorly stocked stands, 6 percent of the forest area. The proportion of the forest area in saw timber is much lower than should exist if the forests in this region were properly managed for saw-timber production. This disproportionate distribution of stand-size classes is largely due to repeated cutting on most of the area and to frequent fires.

The total volume of saw timber is 3.1 billion board feet. Oak species account for more than 70 percent of this total. More than one-half of the volume is scattered in stands classified as pole timber or seedlings and saplings. This volume is largely made up of trees that were unmerchantable at the time of the last cut, but are now merchantable because of the growth or the lowering of merchantability standards. When all of the saw-timber volume is considered, 62 percent is in trees less than 15.0 inches in diameter. As such small hardwood trees contain little high-grade lumber, the figures emphasize the poor quality of timber existing in the area at the present time.

The cubic-foot volume of pole-size trees and sawlog portions of saw-timber trees is 1.3 billion cubic feet. Sixty percent of this volume is in trees less than 11.0 inches in diameter. This again emphasizes the relatively low proportion of larger trees in the stands.

The average board-foot volume per forest acre is 691 board feet. The average cubic volume including pole-size trees and sawlog portions of saw-timber trees is 286 cubic feet. These averages are very low, less than one-half the volume per acre in the hardwood areas of other states.

The total cubic-foot volume of all material, including the volume of pole-sized trees, sawlog portions of saw-timber trees, tops and limbs of hardwoods, and the sound portion of cull trees and trees of noncommercial species is 2.2 billion cubic feet. The volume in cull trees and in trees of noncommercial species account for 25 percent of this total, indicating the large proportion of the growing space occupied by trees with little or no commercial value. Actually the proportion of the space taken up by these trees is greater than this percentage indicates, because it shows only the volume of sound material in these trees. The presence of the large number of cull trees is one of the most serious obstacles to increasing timber production in the Eastern Ozark region.

More detailed information on the forest area and timber volume of the Eastern Ozark region is given in the following tables.

Table 1.--Forest and nonforest area by county, 1947

County	Total land area ^{1/}	Forest area		Nonforest area	
	<u>Thousand acres</u>	<u>Thousand acres</u>	<u>Percent</u>	<u>Thousand acres</u>	<u>Percent</u>
Bollinger	398	219	55	179	45
Butler	458	252	55	206	45
Carter	324	289	89	35	11
Crawford	486	356	73	130	27
Dent	484	340	70	144	30
Iron	354	290	82	64	18
Madison	318	229	72	89	28
Oregon	502	352	70	150	30
Reynolds	526	445	85	81	15
Ripley	409	289	71	120	29
St. Francois	292	159	54	133	46
Shannon	640	525	82	115	18
Washington	486	365	75	121	25
Wayne	497	378	76	119	24
All counties	6,174	4,488	73	1,686	27

^{1/} Source: Area of the United States 1940, U. S. Bureau of Census

Table 2.--Commercial forest area by ownership class, 1947

Ownership class	Commercial forest area <u>1/</u>
	<u>Thousand acres</u>
	<u>Percent</u>
Federal:	
National forest	819
Other	44
Total	863
State	107
Private	3,463
All ownerships	4,433

1/ Does not include 55,000 acres of forest land classified as noncommercial.

Table 3.--Commercial forest area by forest type
and stand-size class, 1947

Forest type	Total		Saw-timber area	Pole-timber area	Seedling & sapling area	Poorly stocked area
	<u>M acres</u>	<u>Per-cent</u>	<u>M acres</u>	<u>M acres</u>	<u>M acres</u>	<u>M acres</u>
Shortleaf pine	120	2.7	22	67	25	6
Cedar hdwd.	68	1.5	0	50	0	18
Oak-pine	626	14.1	69	314	225	18
Oak-hickory	3,240	73.1	373	1472	1,228	167
White oak	109	2.5	32	38	33	6
Bottomland hdwd.	205	4.6	105	73	15	12
Scrub hdwd.	65	1.5	0	0	23	42
All types	4,433		601	2,014	1,549	269
Percent		100.0	13.6	45.4	34.9	6.1

Table 4.--Saw-timber volume on commercial forest area by species and stand-size class, 1947

Species	Total	Saw-timber area	Pole-timber area	Seedling & sapling area	Poorly stocked area
	Million bd. ft.	Percent	Million bd. ft.	Million bd. ft.	Million bd. ft.
Shortleaf pine	291	9.5	127	116	64
Cedar & cypress	20	.6			
White oak	556	18.2			
Post-oak group	343	11.2	118	94	113
Black oak	712	23.3	295	233	155
Scarlet oak	331	10.8	153	126	52
Northern red oak	111	3.6	150	32	38
Other red oaks	115	3.8			
Hickory	223	7.3			
Black gum	73	2.4	233	56	47
Elm	67	2.2			
Sycamore	68	2.2			
Other hwdws.	152	4.9			
All species	3,062	100.0	1,370	871	678
Percent		100.0	44.7	28.5	22.1

Table 5.--Saw-timber volume on commercial forest area by species and tree-diameter class, 1947

Species	Total	Tree-diameter class				
		10 2/ inches	12-14 inches	16-18 inches	20 inches and larger	
	Million bd. ft.	Million bd. ft.	Million bd. ft.	Million bd. ft.	Million bd. ft.	
Shortleaf pine ^{1/}	311	138	146	14	13	
White oak	556	---	359	126	71	
Post-oak group	343	---	202	85	56	
Black oak	712	---	375	160	177	
Scarlet oak	331	---	231	56	44	
Other red oaks	226	---	145	46	35	
Hickory	223	---	165	34	24	
Other hardwoods	360	---	134	115	111	
All species	3,062	138	1,757	636	531	
Percent	100.0	4.5	57.4	20.8	17.3	

1/ Includes the volume of red cedar and cypress.

2/ Ten-inch diameter class shown separately because in this class saw-timber volume includes softwood trees but not hardwoods.

Table 6.--Cubic-foot volume on commercial forest area by
species and stand-size class, 1947

Species	Total	Saw- timber area	Pole- timber area	Seedling & sapling area	Poorly stocked area
	Million cu. ft.	Percent	Million cu. ft.	Million cu. ft.	Million cu. ft.
Shortleaf pine	123.2	9.7			
Cedar & cy- press	11.9	.9	35.5	76.1	21.0
White oak	211.3	16.7	54.7	96.9	51.3
Post-oak group	164.5	13.0	32.9	80.3	44.4
Black oak	286.0	22.6	71.3	159.1	48.2
Scarlet oak	162.4	12.8	35.9	108.5	17.6
Northern red oak	38.1	3.0			
Other red oaks	41.7	3.3	31.8	34.4	11.5
Hickory	117.9	9.3	28.8	54.6	29.2
Black gum	17.3	1.4			
Elm	23.6	1.9			
Sycamore	12.9	1.0	57.4	30.2	15.5
Other hdwds.	55.3	4.4			
All species	1,266.1	100.0	348.3	640.1	238.7
Percent		100.0	27.5	50.6	18.8

Table 7.--Cubic-foot volume on commercial forest area
by stand-size class and tree-diameter class, 1947

Stand-size class	Total	Tree-diameter class				
		6-8 : inches	10 1/ : inches	12-14 : inches	16-18 : inches	20 inches and larger
	<u>Million</u> <u>cu. ft.</u>	<u>Million</u> <u>cu. ft.</u>	<u>Million</u> <u>cu. ft.</u>	<u>Million</u> <u>cu. ft.</u>	<u>Million</u> <u>cu. ft.</u>	<u>Million</u> <u>cu. ft.</u>
Saw timber	348.3	58.4	65.5	116.5	58.2	49.7
Pole timber	640.1	339.6	163.0	104.3	19.8	13.4
Seedling & sapling	238.7	70.3	53.5	70.0	24.3	20.6
Poorly stocked	39.0	8.7	6.4	11.5	5.6	6.8
All classes	1,266.1	477.0	288.4	302.3	107.9	90.5
Percent	100.0	37.7	22.8	23.9	8.5	7.1

1/ Ten-inch diameter class shown separately because saw-timber volume includes softwood trees in this diameter class, but not hardwoods.

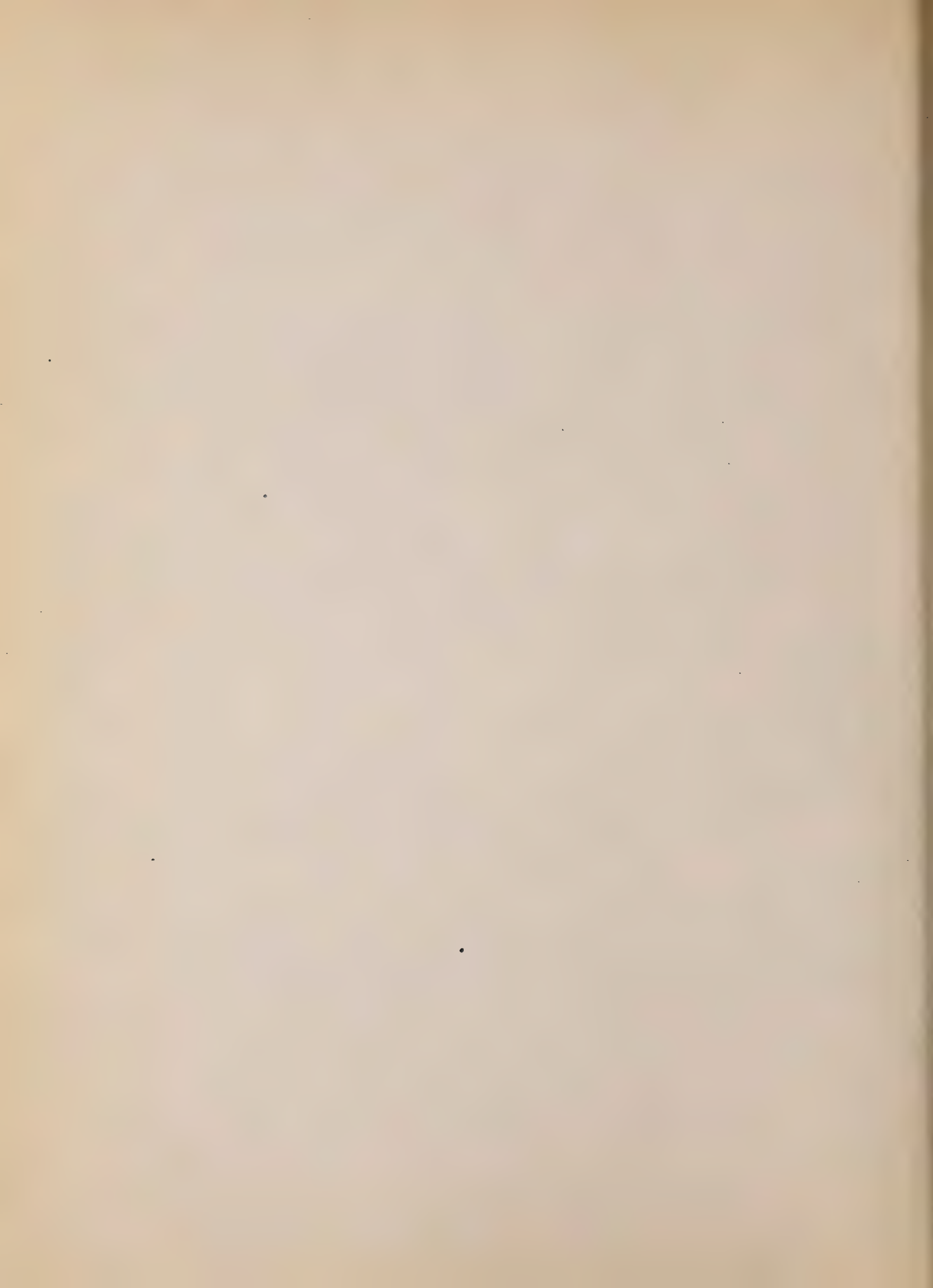
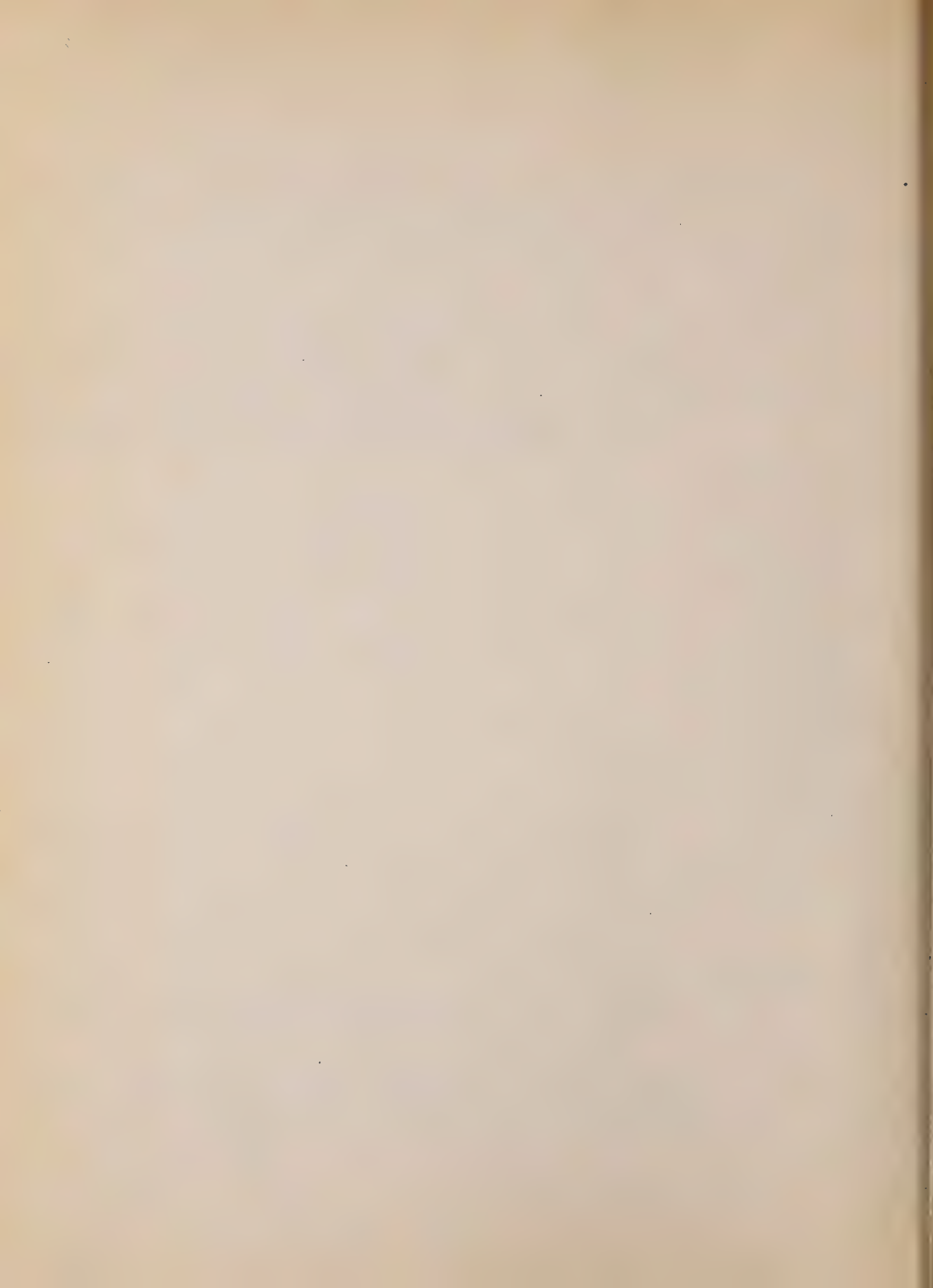


Table 9.--Total cubic-foot volume of sound wood on commercial forest area by species and class of material, 1947

Species	Total	Saw-timber trees			Pole-timber trees	Cull trees
		Total	Sawlog portion	Tops & limbs 1/		
	Million cu. ft.	Million cu. ft.	Million cu. ft.	Million cu. ft.	Million cu. ft.	Million cu. ft.
Shortleaf pine	124.5	66.9	57.0	9.9	68.2	1.6
Cedar & cypress	12.2					
White oak	354.6	155.5	89.4	66.1	121.9	77.2
Post-oak group	306.5	124.6	70.3	54.3	94.2	87.7
Black oak	447.1	210.1	118.5	91.6	167.5	69.5
Scarlet oak	243.4	96.6	54.5	42.1	107.9	38.9
Northern red oak	66.7	65.2	37.1	28.1	42.6	20.7
Other red oaks	61.8					
Hickory	199.2	64.8	36.5	28.3	81.3	53.1
Black gum	37.3	107.3	60.7	46.6	48.6	47.3
Elm	41.8					
Sycamore	24.3					
Other hwdws.	99.8					
Noncommercial species 2/	133.9	--	--	--	--	133.9
All species	2,153.1	891.0	524.0	367.0	732.2	529.9
Percent	100.0	41.4	24.3	17.1	34.0	24.6

1/ Not included in the cubic-foot volumes shown in tables 6 and 7 excepting the 9.9 million cubic feet in tops of softwood trees.

2/ Not included in the cubic-foot volume shown in tables 6 and 7.



APPENDIX



EXPLANATION OF TERMS USED

Forest land - Land bearing forest growth or land from which the forest has been removed but which shows evidence of past forest occupancy and which is not now in other use. To qualify as forest, an area must: (1) be at least 100 feet wide; (2) be at least one acre in area; (3) have a sufficient number of trees to provide 10 percent crown coverage; or (4) lacking 10 percent crown coverage, be likely to remain in forest use.

Commercial forest land - Forest land bearing or capable of bearing timber of commercial character and economically available now or prospectively for commercial use and not withdrawn from such use.

Noncommercial forest land - Forest land not qualifying as commercial forest land. Two classes of forest area are included: (1) commercially valuable forest land withdrawn from timber use for such purposes as parks, game refuges, military reservations or reservoir protection; and (2) forest land which because of poor growing conditions will not produce trees of commercial quality.

Forest types

Shortleaf pine - Stands in which pine trees comprise at least 60% of the dominant and codominant trees.

Cedar-hardwoods - Stands in which red cedar comprises at least 20 percent of the dominant and codominant trees.

Oak-pine - Stands of pine, oaks and other hardwoods in which pines comprise 20-60 percent of the dominant and codominant trees.

Oak-hickory - Stands of hardwoods in which oaks and hickories comprise at least 60 percent of the dominant and codominant trees.

White oak - Stands in which white oak (*Quercus alba*) comprises at least 60 percent of the dominant and codominant trees.

Bottomland hardwoods - Stands on the alluvial bottoms of rivers and streams. The principal species include sycamore, willow, elm, blackgum, sweetgum, soft maple, oaks, hickory, cottonwood, and cypress.

Scrub hardwoods - Stands in which scrub oak or other noncommercial tree species comprise 60 percent of the dominant and codominant trees.

Tree Classes

Sound saw-timber tree - A coniferous tree at least 9.0 inches d.b.h. (diameter outside bark at 4.5 feet above ground), or a hardwood tree at least 11.0 inches d.b.h., with a sound butt log at least 8 feet long, or with at least half of the gross volume of the tree in sound material.

Sound pole-timber tree - A tree at least 5.0 inches d.b.h. but less than saw-timber size, which now is or gives promise of becoming a sound merchantable tree.

Cull tree - A tree that does not qualify as a sound pole-timber or saw-timber tree because of poor form, limbiness, rot, or other defect.

Volume Estimates

Board-foot volume - Includes the volume of that portion of saw-timber trees merchantable for sawlogs. Volume deductions have been made for rot, crook, and other defects. Board-foot volumes are shown in the International 1/4 inch log rule, which approximates green lumber tally.

Cubic-foot volume - Except where specifically noted, includes the volume of sound wood inside bark in: (1) the saw-timber portion of sound trees, (2) the upper stems of saw-timber-size conifers to a minimum diameter of 4 inches inside bark, and (3) the sound pole-timber trees to the same minimum top diameter.

Stand-size Classes

Saw timber - Stands having a minimum net volume of 1500 board feet per acre.

Pole timber - Stands having a net volume of less than 1500 board feet per acre but which are at least 10 percent stocked with pole-size and larger trees. At least one-half the minimum stocking must be in pole-size trees.

Seedlings and saplings - Stands not qualifying either for saw timber or pole timber but having at least 300 seedlings and saplings of commercial species per acre.

Poorly stocked - Commercial forest land not qualifying for any other class, including denuded areas.

Species Listed

Shortleaf pine - Pinus echinata. Includes a small volume of other pines occurring in plantations.

Cedar and cypress - Eastern red cedar - Juniperus virginiana. Bald-cypress - Taxodium distichum. These species have been combined as neither was found in sufficient quantity to provide an accurate volume estimate.

White oak - Quercus alba.

Post-oak group includes:

Post oak - Quercus stellata

Swamp white oak - Quercus bicolor

Swamp chestnut oak - Quercus prinus

Overcup oak - Quercus lyrata

Bur oak - Quercus macrocarpa

Chinquapin oak - Quercus muehlenbergii

Post oak is the principal species.

Black oak - Quercus velutina

Scarlet oak - Quercus coccinea

Northern red oak - Quercus borealis

Other red oaks include:

Southern red oak - Quercus falcata

Pin oak - Quercus palustris

Willow oak - Quercus phellos

Water oak - Quercus nigra

Shingle oak - Quercus imbricaria

Hickory - includes all species of hickory (Carya)

Blackgum - Nyssa sylvatica - Nyssa aquatica

Elm - includes all species of elm (Ulmus)

Sycamore - Platanus occidentalis

Other hardwoods - Includes all other commercial hardwood species.

Noncommercial species - Includes species which do not normally have commercial value such as blackjack oak, sassafras, blue beech, ironwood, alder, redbud, and service berry.

FOREST SURVEY PROCEDURE

The inventory of the forest resources of the Eastern Ozark region was made during the period September 1946 to February 1947. A sampling procedure was used involving an office study of aerial photographs and a field examination of randomly selected forest and nonforest plots.

The proportion of forest land by counties was obtained by placing over each photograph a transparent template with four uniformly spaced dots and counting the number of dots falling on forest and on nonforest areas. The percentage of forest dots in a county applied to the total land area gave a preliminary estimate of the forest acreage.

The location of alternate dots falling on forest land was marked on the photograph. The acre surrounding each marked dot was examined under stereoscope and classified by stand-size class on the basis of the height, crown width, and density of trees on the plot.

Plots for field examination were selected from those photo classified as follows:

Saw timber - - - - -	1 in 5
Pole timber - - - - -	1 in 10
Seedling and sapling- - - -	1 in 20
Poorly stocked - - - - -	1 in 10

In addition, every 50th nonforest plot was selected for field examination to measure the movement of nonforest land to forest.

The locations of the selected plots were marked on the photographs which were then sent to the field. Crews of two men each located these points on the ground and at each established a 1/5 acre plot on which they recorded the species, size, condition, and growth rate of trees, and the forest type and site quality of plots. A field check of the photo interpreter's stand-size class determination was also made. The field examination also provided a basis for adjusting the preliminary estimate of forest and nonforest area.

A total of 21,740 dots were counted on the photos for forest area determination. Stereoscopic examinations were made on 7,912 forest plots to determine stand-size class, and 882 plots were examined on the ground. These photo and field examinations provided the basic data for computation of forest area and timber volume statistics for the unit.

ACCURACY OF DATA

Forest area - Statistical analysis of the forest area data for the Eastern Ozark region shows a sampling error of ± 0.8 percent of the total forest area or $\pm 36,000$ acres, at a level of one standard deviation. The error of estimate increases with each subdivision of the total forest area so that small tabular acreages may have a large error and therefore indicate only relative magnitude. The sampling error of the forest area estimate of individual counties is within ± 5.0 percent.

Timber volume - The sampling error of the total board-foot volume in the region is ± 2.5 percent or ± 77 million board feet. This does not include the errors of volume tables, cull factors, or other phases of the inventory work for which satisfactory methods of measuring accuracy have not been developed. All phases of field work and computations were closely supervised to keep these errors at a minimum. Again the error of estimate increases with each subdivision of the total volume so that small volumes indicate only relative magnitudes.



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FOREST SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

